PEER REVIEW OF "RADIONUCLIDE SOIL ACTION LEVEL REGULATORY ANALYSIS"

Reviewer 1

February 16, 2001

OVERALL EVALUATION

- Is the regulatory approach described in the report appropriate for developing Radioactive Soil Action Levels for the Rocky Flats Environmental Technology Site?

- If the approach is inadequate in any way, why is it inadequate and what approaches would be appropriate?

The regulatory approach described in the draft report is clearly written. I believe that it is a positive first step in developing a decision tool that can be applied to the clean up of the Rocky Flats Environmental Technology Site.

Based on my reading of the document and its two appendices, I have listed below areas of concern and questions regarding the regulatory analysis. As the regulatory analysis is refined, I believe that future drafts would be strengthened if responses to these questions and concerns were incorporated in them.

❖ The regulatory analysis should explain the how the Radionuclide Soil Action Levels (RSALs) are intended to protect public health.

A basic tenet of Superfund is that clean ups are undertaken to protect public health and the environment. The regulatory analysis should begin by explaining how use of the RSALs is intended to protect public health.

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RADIOACTIVE SOIL ACTION LEVEL REGULATORY ANALYSIS

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❖ The definition and purpose of RSALs are not clear.

The regulatory analysis contains conflicting definitions and explanations of the concept of RSALs. It was not possible for me to obtain a clear understanding of (1) when RSALs are to be applied; (2) what specific action, if any, an exceedence of an RSAL triggers; and (3) whether RSALs are intended to be public health protective. I cannot discern whether RSALs are intended to act as soil screening levels or clean up levels, or something in between.

Conflicting and ambiguous statements describing the RSALs occur throughout the regulatory analysis. For example, on page 1 (under the heading "Background") it states "[a]n action level is a numeric level that, when exceeded, triggers an evaluation, remedial action, and/or management action." On page 13 (under the heading "Proposal for the RSAL and Cleanup Decisions") it states

> "[t]he RSAL will be used to determine where cleanup actions will be taken at Rocky Flats. Once an action has been determined to be necessary (i.e. contamination is present in excess of the RSAL), the alternatives analysis, including application of the ALARA process, for that action will include cleanup to a level that supports unrestricted use; the suburban resident scenario. In other words, for each area of the site where contamination exceeds the RSAL, DOE will perform an evaluation to determine what level of contamination removal is reasonably achievable."

In attachment 2 (the flow diagram) it states "RSALS trigger cleanup actions" and "RSAL represents minimum cleanup case – some action must be taken (source removal, in-situ immobilization, barriers, access controls, etc.)"

If RSALs are screening levels, then it would be appropriate to review EPA's relatively new soil screening guidance documents (ORIA/Superfund, Soil Screening Guidance for Radionuclides: User's Manual, OSWER No. 9355.4-16A, and related documents) for conformity. If RSALs are cleanup levels, then the Risk Assessment Guidance for Superfund (RAGS), Volume I, especially chapter 4 of Part B (Risk-Based PRGs for Radioactive Contaminants) could serve as a guide.

- Issues associated with drinking and ground water contamination, and their relationship to RSALs, are not addressed.

It is my understanding that the Rocky Flats site is an NPL site. As such, it is subject to the provisions of Superfund and its implementing regulations contained in the National Contingency Plan. Two requirements must be met at every Superfund site. First, all remedial actions must be protective of human health and the environment. Second, site clean ups should protect ground waters that are current or potential sources of drinking water.[1]

Drinking and ground water protection is not discussed in the regulatory analysis.[2] Although the analysis states that the RSALs will be used to address surface contamination, it is pointed out that "[m]eeting the RSAL will in no way guarantee that the surface water standard won't be violated." although it is anticipated that surface water standards will be met through other means (page 14 and attachment 2).

The regulatory analysis would be strengthened if it included a discussion of drinking and ground water issues at the Rocky Flats site and an examination of ground water protection measures that will be taken. It is my understanding that the ground water at

[1] Shapiro, M. Restoration Principles and Criteria: Superfund Program Policy For Cleanup At Radiation Contaminated Sites (paper presented at the 1999 IAEA Meeting, Arlington, VA).

[2] The NRC Decommissioning Rule does not deal with ground water protection separately. It sets a cumulative dose standard from all sources. In contrast, EPA Superfund analyses break out exposure pathways and pay particular attention to groundwater when it is used, or could be potentially used, as drinking water.

Rocky Flats is contaminated.[3] If that is so, Superfund will most likely demand some sort of clean up action if the ground water is a current or potential future source of drinking water. This could involve, among other things, applying the MCLs for radionuclides as clean up standards for contaminated ground water.

It is possible that drinking and ground water issues are addressed in another document that was not made available to me. If that is the case, please disregard the bulk of this comment. Nevertheless, given that the RSALs represent soil action levels, I would suggest that some discussion of drinking and ground water protection should be included in the regulatory analysis, even it is only a cross reference to, or summary of, the report that discusses drinking and ground water.

❖ The use of the NRC Decommissioning Rule may not be appropriate.

Pages 3, 4 and 5 discuss the NRC Decommissioning rule and argue that it is applicable to Rocky Flats because "the State of Colorado has adopted the NRC rule as a state regulation and while the rule is not applicable to Rocky Flats the state has identified the rule as relevant and appropriate; and therefore the substantive provisions should be used to govern cleanup of the site."

Pages 5 and 6 examine selected EPA OSWER guidance documents, which criticize the applicability of the NRC Decommissioning Rule to Superfund sites. Nevertheless, the regulatory analysis adopts the Decommissioning Rule as "one of the key requirements that will govern the cleanup of Rocky Flats." (page 11, first line under heading "Proposed Framework for RSALs and Cleanup Decisions.")

I believe that a reanalysis of the applicability of the Decommissioning rule to the Rocky Flats clean up is necessary. First, the applicability of the NRC rule has been extensively explored by EPA in a series of OSWER directives. Although these

[3] Personal conversation, Mr. Reed Hodgin, 14 February 2001

directives do not have the force of law, they are nonetheless crucial in understanding EPA's interpretation of Superfund.

OSWER document No. 9200.4-18 (pages 2-3) states that:

> "It is important to note that a new potential ARAR was recently promulgated: [the NRC Decommissioning Rule]. We expect that NRC's implementation of the rule … will result in cleanups within the Superfund risk range at the vast majority of NRC sites. (Emphasis added.) However, EPA has determined that the dose limits established in this rule as promulgated generally will not provide a protective basis for establishing preliminary remediation goals (PRGs) under CERCLA. Accordingly, while the NRC rule standard must be met (or waived) at sites where it is applicable or relevant and appropriate, cleanups at these sites will typically have to be more stringent than required by the NRC dose limits in order to meet the CERCLA and NCP requirement to be protective."

Some of this language is interpreted in the middle of page 6 of the regulatory analysis. A great deal of emphasis is placed on the use of the terms "generally" and "typically." Perhaps I am mistaken, but after reading pages 6 and 7 of the regulatory analysis I am left with the impression that because the NRC Decommissioning rule is an ARAR, and because for some radionuclides the 25 mrem/year dose level could be protective, the NRC rule is somehow acceptable for Rocky Flats.

My reading of OSWER guidance documents numbers 9200.4-18, 9200.4-23, 9272.0-15P and EPA's "Radiation Risk Assessment At CERCLA Sites: Q & A" (December 17, 1999) indicates that EPA believes that the NRC Decommissioning Rule is not acceptable for establishing clean up levels at the vast majority of Superfund sites. For example, OSWER No. 9272.0-15P states "[t]he 1997 radiation guidance [OSWER No. 9200.4-18] provided clarification for establishing protective cleanup levels for radioactive contamination at CERCLA sites. In it, EPA recommended that the NRC

decommissioning requirements .. should generally not be used to establish cleanup levels under CERCLA, even when these regulations are ARARs." (See pages 2 – 3.) Almost identical language is repeated in the "Radiation Risk Assessment at CERCLA Sites: Q & A" (see question 34, page 14).

If the RSALs are to be used to assist in making decisions about Superfund cleanups, it seems to me that EPA's critique of the NRC Decommissioning rule must be addressed more directly.[4]

- Institutional controls (ICs) are discussed, but not identified in detail, in the regulatory analysis.

Pages 7 – 11 of the regulatory analysis point out that it is unlikely that the entire Rocky Flats site will be cleaned up to allow for unrestricted use. Because some or all of the site will contain residual radioactive contamination, the regulatory analysis notes that ICs will be used to reduce exposure.

Generally speaking, ICs are "non-engineering measures – usually, but not always legal controls – intended to affect human activities in a way that prevents or reduces exposure to hazardous substances."[5] Only one IC – federal ownership/stewardship was mentioned in the regulatory analysis.

If possible, it would be very helpful to provide a list of potential ICs that could be used at Rocky Flats. Although it may be too early in the clean up process to determine precisely how these ICs will be applied, it would be helpful in assessing the RSALs to know more about what ICs could potentially be used. It is possible that exceeding an

[4] By offering this critique, I do not mean to imply that I believe that the NRC Decommissioning rule is not protective of public health. Rather, I am merely pointing out that for purposes of Superfund, my reading of EPA's guidance documents and experience working on these issues leads me to question the rule's applicability to Rocky Flats as described in the regulatory analysis.

[5] Shapiro, M. Restoration Principles and Criteria: Superfund Program Policy For Cleanup At Radiation Contaminated Sites (paper presented at the 1999 IAEA Meeting, Arlington, VA) p. 8.

RSAL could trigger the application of an IC. In other words, if an RSAL is exceeded at the site and clean up for unrestricted use is not feasible or desirable, it is very possible that one or more ICs will be put in place.

The use of ICs is relatively new, and experience with them is not extensive. Over the long term, it is not possible to predict which, if any, ICs will succeed in reducing or eliminating exposure.[6] A potential list of ICs for Rocky Flats would be useful in engaging stakeholders who are likely to be the parties most affected by, and in charge of implementing, ICs. It could be useful in explaining the ALARA analysis set out on page 10.

2. Clean up goals should be calculated in terms of risk, not dose, to comply with the OSWER directives that interpret the NCP and CERCLA.

The regulatory analysis proposes that RSALs will be calculated based on dose and risk; the more conservative value between dose and risk will then be chosen (see pages 11 – 12). The EPA OSWER guidance documents (discussed above) make it clear that clean ups under Superfund should work with risk, not dose. According to the EPA guidance, at Superfund sites dose assessments should generally not be performed to assess risk or to establish clean up levels.[7]

Similarly, attachment 1 contains the statement that "EPA believes that the Dose Conversion Method is fine for calculating the risks of exposure to low LET radiation … but does not work well for internal exposure to alpha and beta emitting radionuclides. In the case of internal exposure, the Dose Conversion Method generally overestimates the risk …" (page 3). According to EPA Guidance[8], "[e]stimates of cancer risk from

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[6] Environmental Law Institute. Protecting Public Health at Superfund Sites: Can Institutional Controls Meet the Challenge? Washington, DC. 2000

[7] Environmental Protection Agency. Radiation Risk Assessment at CERCLA sites: Q & A. Washington, DC (December 17, 1999) p. 13, Q32.

[8] Environmental Protection Agency. Radiation Risk Assessment at CERCLA sites: Q & A. Washington, DC (December 17, 1999) pp. 10 & 12, Q24 and Table 2.

radionuclide exposures may also be computed by multiplying the effective dose equivalent computed using the DFCs by a risk-per-dose factor. EPA recommends that this method **not** be used at CERCLA sites to estimate risks for PRGs or cleanup levels, and estimates computed using this method may tend to inaccurately estimate potential risks, with the magnitude of discrepancy dependent on the dominant radionuclides and exposure pathways for the site specific conditions."

This statement seem to conflict with several of the conclusions made in attachment 1.

Finally, EPA guidance points out that 15mrem/year in not a presumptive clean up level under CERCLA. In determining clean up levels, the agency recommends a risk range approach (1 x 10-4 to 1 x 10 –6).[9]

- ❖ Additional important information would greatly assist in analyzing the public health protectiveness and appropriateness of the RSALs.

The regulatory analysis would be more useful if it addressed the following:

- a fuller discussion linking the 9 Superfund criteria, especially the modifying and balancing criteria, with ALARA (see page 7);
- if uranium is a contaminant of concern at Rocky Flats, a discussion of whether an RSAL for toxicity (based perhaps on the uranium RfD) would be appropriate;
- a complete discussion of exposure pathways, and how RSALs are related to these exposure pathways (see page 2, RESRAD model);
- a discussion and analysis of RME in the context of the eight scenarios set out in the table on page 13; and
- a discussion of the time factor, especially as it relates to long lived radionuclides, restricted releases and maintenance of ICs.

[9] Environmental Protection Agency. Radiation Risk Assessment at CERCLA sites: Q & A. Washington, DC (December 17, 1999) p. 13, Q32.

SPECIFIC AREAS, ISSUES, AND QUESTIONS

2. What is the relevance of the U.S. Environmental Protection Agency (EPA) CERCLA guidance to specific cleanup at RFETS?

RFETS is an NPL site. As such, it is governed by the Superfund law and its implementing regulations, the National Contingency Plan or NCP. CERCLA guidance documents interpret the Superfund statute and NCP. Although these guidance documents do not have the force of law, they are very important in determining how to go about cleaning up a Superfund site. This is particularly true because Superfund provides that resources can be spent on clean up costs that are in furtherance of the NCP.

3. Is the Nuclear Regulatory Commission (NRC) rule actually an ARAR for this application – does the 25 mrem dose level under NRC rule meet the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) risk requirement?

The NRC Decommissioning rule appears to be an ARAR at Rocky Flats. However, in its guidance documents EPA has taken the position that the Decommissioning Rule requirements (25 mrem/year and 100 mrem/year dose limits) generally should not be used to establish clean-up levels under CERCLA.

5. Which method of health impact evaluation – dose assessment or risk assessment—will be most protective of human health?

Both methods can be protective of human health. In the case of Superfund, however, EPA guidance states that cleanup evaluations should be risk, not dose, based.

11. Does the wildlife worker scenario described in the document meet the CERCLA criterion for protection of the reasonably maximally exposed individual, especially with regard to the long-term stewardship period?

It is not possible for me to tell whether the wildlife worker scenario, or any of the other scenarios, represent the RME. Additional information, especially information about pathways of exposure, specific contaminants of exposure, and time of exposure, are needed. The time element is particularly important because the half-lives of radionuclides vary greatly.

For evaluating long term stewardship, additional information about the types of institutional controls would also be needed.